



#14/a

SEQUENCE LISTING

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Gwen Liu
Hung Ton-That

<120> IDENTIFICATION OF SORTASE GENE

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<141> 1999-04-15

<160> 36

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<212> PRT
<213> Bacteria

<220>
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<223> Any naturally-occurring amino acid

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1 5

<210> 2
<211> 621
<212> DNA
<213> Staphylococcus aureus

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1 5 10 15

atc cta gtg gca gca tat ttg ttt gct aaa cca cat atc gat aat tat
96
Ile Leu Val Ala Ala Tyr Leu Phe Ala Lys Pro His Ile Asp Asn Tyr
20 25 30

ctt cac gat aaa gat aaa gat gaa aag att gaa caa tat gat aaa aat
144
Leu His Asp Lys Asp Lys Asp Glu Lys Ile Glu Gln Tyr Asp Lys Asn
35 40 45

gta aaa gaa cag gcg agt aaa gat aaa aag cag caa gct aaa cct caa
192
Val Lys Glu Gln Ala Ser Lys Asp Lys Lys Gln Gln Ala Lys Pro Gln
50 55 60

att ccg aaa gat aaa tcg aaa gtg gca ggc tat att gaa att cca gat
240
Ile Pro Lys Asp Lys Ser Lys Val Ala Gly Tyr Ile Glu Ile Pro Asp
65 70 75 80

gct gat att aaa gaa cca gta tat cca gga cca gca aca cct gaa caa

288
Ala Asp Ile Lys Glu Pro Val Tyr Pro Gly Pro Ala Thr Pro Glu Gln
85 90 95

tta aat aga ggt gta agc ttt gca gaa gaa aat gaa tca cta gat gat
336

Leu Asn Arg Gly Val Ser Phe Ala Glu Glu Asn Glu Ser Leu Asp Asp
100 105 110

caa aat att tca att gca gga cac act ttc att gac cgt ccg aac tat
384

Gln Asn Ile Ser Ile Ala Gly His Thr Phe Ile Asp Arg Pro Asn Tyr
115 120 125

caa ttt aca aat ctt aaa gca gcc aaa aaa ggt agt atg gtg tac ttt
432

Gln Phe Thr Asn Leu Lys Ala Ala Lys Lys Gly Ser Met Val Tyr Phe
130 135 140

aaa gtt ggt aat gaa aca cgt aag tat aaa atg aca agt ata aga gat
480

Lys Val Gly Asn Glu Thr Arg Lys Tyr Lys Met Thr Ser Ile Arg Asp
145 150 155 160

gtt aag cct aca gat gta gga gtt cta gat gaa caa aaa ggt aaa gat
528

Val Lys Pro Thr Asp Val Gly Val Leu Asp Glu Gln Lys Gly Lys Asp
165 170 175

aaa caa tta aca tta att act tgt gat gat tac aat gaa aag aca ggc
576

Lys Gln Leu Thr Leu Ile Thr Cys Asp Asp Tyr Asn Glu Lys Thr Gly
180 185 190

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621

Val Trp Glu Lys Arg Lys Ile Phe Val Ala Thr Glu Val Lys *
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<211> 206
<212> PRT
<213> Staphylococcus aureus

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35 40 45
Val Lys Glu Gln Ala Ser Lys Asp Lys Lys Gln Gln Ala Lys Pro Gln
50 55 60
Ile Pro Lys Asp Lys Ser Lys Val Ala Gly Tyr Ile Glu Ile Pro Asp
65 70 75 80
Ala Asp Ile Lys Glu Pro Val Tyr Pro Gly Pro Ala Thr Pro Glu Gln
85 90 95
Leu Asn Arg Gly Val Ser Phe Ala Glu Glu Asn Glu Ser Leu Asp Asp
100 105 110
Gln Asn Ile Ser Ile Ala Gly His Thr Phe Ile Asp Arg Pro Asn Tyr
115 120 125
Gln Phe Thr Asn Leu Lys Ala Ala Lys Lys Gly Ser Met Val Tyr Phe
130 135 140
Lys Val Gly Asn Glu Thr Arg Lys Tyr Lys Met Thr Ser Ile Arg Asp

145					150					155				160
Val	Lys	Pro	Thr	Asp	Val	Gly	Val	Leu	Asp	Glu	Gln	Lys	Gly	Lys
				165					170					175
Lys	Gln	Leu	Thr	Leu	Ile	Thr	Cys	Asp	Asp	Tyr	Asn	Glu	Lys	Thr
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		195					200					205		

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 <212> PRT
 <213> Streptococcus pyogenes

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			20					25					30		
Lys	Asn	Tyr	Glu	Ser	Leu	Leu	Gln	Ile	Glu	Asn	Asn	Asp	Ile	Met	Gly
		35					40					45			
Tyr	Val	Glu	Val	Pro	Ser	Ile	Lys	Val	Thr	Leu	Pro	Ile	Tyr	His	Tyr
	50					55					60				
Thr	Thr	Asp	Glu	Val	Leu	Thr	Lys	Gly	Ala	Gly	His	Leu	Phe	Gly	Ser
65					70					75				80	
Ala	Leu	Pro	Val	Gly	Gly	Asp	Gly	Thr	His	Thr	Val	Ile	Ser	Ala	His
			85						90					95	
Arg	Gly	Leu	Pro	Ser	Ala	Glu	Met	Phe	Thr	Asn	Leu	Asn	Leu	Val	Lys
			100					105					110		
Lys	Gly	Asp	Thr	Phe	Tyr	Phe	Arg	Val	Leu	Asn	Lys	Val	Leu	Ala	Tyr
		115					120					125			
Lys	Val	Asp	Gln	Ile	Leu	Thr	Val	Glu	Pro	Asp	Gln	Val	Thr	Ser	Leu
	130					135						140			
Ser	Gly	Val	Met	Gly	Lys	Asp	Tyr	Ala	Thr	Leu	Val	Thr	Cys	Thr	Pro
145					150					155					160
Tyr	Gly	Val	Asn	Thr	Lys	Arg	Leu	Leu	Val	Arg	Gly	His	Arg	Ile	Ala
			165						170					175	
Tyr	His	Tyr	Lys	Lys	Tyr	Gln	Gln	Ala	Lys	Lys	Ala	Met	Lys	Leu	Val
			180				185						190		
Asp	Lys	Ser	Arg	Met	Trp	Ala	Glu	Val	Val	Cys	Ala	Ala	Phe	Gly	Val
		195					200					205			
Val	Ile	Ala	Ile	Ile	Leu	Val	Phe	Met	Tyr	Ser	Arg	Val	Ser	Ala	Lys
	210					215					220				
Lys	Ser	Lys													
225															

<210> 5
 <211> 365
 <212> PRT
 <213> Actinomyces naeslundii

<400> 5

Met	Gly	Leu	Leu	Thr	Tyr	Pro	Thr	Ala	Ala	Ser	Trp	Val	Ser	Gln	Tyr
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Asn	Gln	Ser	Lys	Val	Thr	Ala	Asp	Tyr	Ser	Ala	Gln	Val	Asp	Gly	Ala
			20					25					30		
Arg	Pro	Asp	Ala	Lys	Thr	Gln	Val	Glu	Gln	Ala	His	Ala	Tyr	Asn	Asp
		35					40					45			
Ala	Leu	Ser	Ala	Gly	Ala	Val	Leu	Glu	Ala	Asn	Asn	His	Val	Pro	Thr
	50					55					60				
Gly	Ala	Gly	Ser	Ser	Lys	Asp	Ser	Ser	Leu	Gln	Tyr	Ala	Asn	Ile	Leu
65					70					75				80	
Lys	Ala	Asn	Asn	Glu	Gly	Leu	Met	Ala	Arg	Leu	Lys	Ile	Pro	Ser	Ile
			85						90					95	
Ser	Leu	Asp	Leu	Pro	Val	Tyr	His	Gly	Thr	Ala	Asp	Asp	Thr	Leu	Leu
			100					105						110	

Leu	Val	Thr	Leu	Leu	Thr	Cys	Thr	Pro	Tyr	Met	Ile	Asn	Ser	His	Arg
210						215					220				
Leu	Leu	Val	Arg	Gly	His	Arg	Ile	Pro	Tyr	Gln	Pro	Glu	Lys	Ala	Ala
225					230					235					240
Ala	Gly	Met	Lys	Lys	Val	Ala	Gln	Gln	Gln	Asn	Leu	Leu	Leu	Trp	Thr
				245					250					255	
Leu	Leu	Leu	Ile	Ala	Cys	Ala	Leu	Ile	Ile	Ser	Gly	Phe	Ile	Ile	Trp
			260					265					270		
Tyr	Lys	Arg	Arg	Lys	Lys	Thr	Thr	Arg	Lys	Pro	Lys				
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<210> 7
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 <212> PRT
 <213> Streptococcus mutans

<400> 7

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			20					25					30		
Thr	Pro	Ile	Arg	Asn	Ala	Leu	Ile	Ala	Trp	Asn	Thr	Asn	Arg	Tyr	Gln
		35					40					45			
Val	Ser	Asn	Val	Ser	Lys	Lys	Asp	Ile	Glu	His	Asn	Lys	Ala	Ala	His
	50					55					60				
Ser	Ser	Phe	Asp	Phe	Lys	Lys	Val	Glu	Ser	Ile	Ser	Thr	Gln	Ser	Val
65					70					75				80	
Leu	Ala	Ala	Gln	Met	Ala	Ala	Gln	Lys	Leu	Pro	Val	Ile	Gly	Gly	Ile
			85						90				95		
Ala	Ile	Pro	Asp	Leu	Lys	Ile	Asn	Leu	Pro	Ile	Phe	Lys	Gly	Leu	Asp
			100					105					110		
Asn	Val	Gly	Leu	Thr	Tyr	Gly	Ala	Gly	Thr	Met	Lys	Asn	Asp	Gln	Val
		115					120					125			
Met	Gly	Glu	Asn	Asn	Tyr	Ala	Leu	Ala	Ser	His	His	Val	Phe	Gly	Met
	130					135					140				
Thr	Gly	Ser	Ser	Gln	Met	Leu	Phe	Ser	Pro	Leu	Glu	Arg	Ala	Lys	Glu
145					150					155					160
Gly	Met	Glu	Ile	Tyr	Leu	Thr	Asp	Lys	Asn	Lys	Val	Tyr	Thr	Tyr	Val
				165					170					175	
Ile	Ser	Glu	Val	Lys	Thr	Val	Thr	Pro	Glu	His	Val	Glu	Val	Ile	Asp
			180					185					190		
Asn	Arg	Pro	Gly	Gln	Asn	Glu	Val	Thr	Leu	Val	Thr	Cys	Thr	Asp	Ala
		195					200					205			
Gly	Ala	Thr	Ala	Arg	Thr	Ile	Val	His	Gly	Thr	Tyr	Lys	Gly	Glu	Asn
	210					215					220				
Asp	Phe	Asn	Lys	Thr	Ser	Lys	Lys	Ile	Lys	Lys	Ala	Phe	Arg	Gln	Ser
225					230					235					240
Tyr	Asn	Gln	Ile	Ser	Phe										
				245											

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 <213> Bacillus subtilis

<400> 8

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Ala	Gly	Tyr	Gly	Gly	Phe	Lys	Leu	Ile	Asp	Thr	Asn	Thr	Lys	Thr	Glu
			20					25					30		
Gln	Thr	Leu	Lys	Glu	Ala	Lys	Leu	Ala	Ala	Lys	Lys	Pro	Gln	Glu	Ala
		35					40					45			
Ser	Gly	Thr	Lys	Asn	Ser	Thr	Asp	Gln	Ala	Lys	Asn	Lys	Ala	Ser	Phe
	50					55					60				
Lys	Pro	Glu	Thr	Gly	Gln	Ala	Ser	Gly	Ile	Leu	Glu	Ile	Pro	Lys	Ile

<213> Streptococcus pyogenes
 <400> 13
 Ser Ile Gly Thr Tyr Leu Phe Lys Ile Gly Ser Ala Ala Met Ile Gly
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 Ala Ile Gly Ile Tyr Ile Val
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 <211> 22
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 <213> Listeria monocytogenes
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 Thr Ala Met Ala Leu Thr
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 <213> Staphylococcus aureus
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 Arg Arg Arg Glu Leu
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 Arg Arg Asn Lys Lys Asn His Lys Ala
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 Arg Arg Lys Gln Asp
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 <213> Streptococcus pyogenes
 <400> 19
 Lys Arg Arg Lys Ala
 1 5
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<211> 8
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 <213> Actinomyces viscosus

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 Lys Arg Arg His Val Ala Lys His
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 <210> 21
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 <213> Streptococcus aglactiae

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 Lys Arg Arg Lys Ser
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 <210> 22
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 <213> Streptococcus pyogenes

 <400> 22
 Lys Arg Lys Glu Glu Asn
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 <210> 23
 <211> 5
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 <400> 23
 Arg Arg Arg Glu Ser
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 <210> 24
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 Arg Arg Arg Ser Leu
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 <210> 25
 <211> 5
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 <400> 25
 Arg Arg Ser Glu Leu
 1 5

 <210> 26
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 <400> 26
 Arg Ser Arg Glu Leu
 1 5

 <210> 27
 <211> 5
 <212> PRT

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    <213> Mutated derived from streptococcus pyogenes

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    <210> 28
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    <213> Mutated derived from streptococcus pyogenes

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Arg Arg Ser Ser Ser
1          5

    <210> 29
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    <213> Mutated derived from streptococcus pyogenes

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Arg Ser Arg Ser Ser
1          5

    <210> 30
    <211> 5
    <212> PRT
    <213> Mutated derived from streptococcus pyogenes

    <400> 30
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1          5

    <210> 31
    <211> 19
    <212> PRT
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Asn Pro Phe

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    <211> 29
    <212> DNA
    <213> Staphylococcus aureus

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29

    <210> 33
    <211> 29
    <212> DNA
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    <400> 33
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29

    <210> 34
    <211> 283
    <212> PRT

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<213> Streptococcus pneumoniae srtA

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20      25      30
Ser Leu Gly Gln Val Lys Gly His Ala Thr Phe Val Lys Ser Met Thr
35      40      45
Thr Glu Met Tyr Gln Glu Gln Gln Asn His Ser Leu Ala Tyr Asn Gln
50      55      60
Arg Leu Ala Ser Gln Asn Arg Ile Val Asp Pro Phe Leu Ala Glu Gly
65      70      75      80
Tyr Glu Val Asn Tyr Gln Val Ser Asp Asp Pro Asp Ala Val Tyr Gly
85      90      95
Tyr Leu Ser Ile Pro Ser Leu Glu Ile Met Glu Pro Val Tyr Leu Gly
100     105     110
Ala Asp Tyr His His Leu Gly Met Gly Leu Ala His Val Asp Gly Thr
115     120     125
Pro Leu Pro Leu Asp Gly Thr Gly Ile Arg Ser Val Ile Ala Gly His
130     135     140
Arg Ala Glu Pro Ser His Val Phe Phe Arg His Leu Asp Gln Leu Lys
145     150     155     160
Val Gly Asp Ala Leu Tyr Tyr Asp Asn Gly Gln Glu Ile Val Glu Tyr
165     170     175
Gln Met Met Asp Thr Glu Ile Ile Leu Pro Ser Glu Trp Glu Lys Leu
180     185     190
Glu Ser Val Ser Ser Lys Asn Ile Met Thr Leu Ile Thr Cys Asp Pro
195     200     205
Ile Pro Thr Phe Asn Lys Arg Leu Leu Val Asn Phe Glu Arg Val Ala
210     215     220
Val Tyr Gln Lys Ser Asp Pro Gln Thr Ala Ala Val Ala Arg Val Ala
225     230     235     240
Phe Thr Lys Glu Gly Gln Ser Val Ser Arg Val Ala Thr Ser Gln Trp
245     250     255
Leu Tyr Arg Gly Leu Val Val Leu Ala Phe Leu Gly Ile Leu Phe Val
260     265     270
Leu Trp Lys Leu Ala Arg Leu Leu Arg Gly Lys
275     280

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<210> 35

<211> 296

<212> PRT

<213> Streptococcus pneumoniae srtB

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Ile Tyr Pro Leu Val Ser Arg Tyr Tyr Tyr Arg Ile Ser Asn Glu Val
35      40      45
Ile Lys Glu Phe Asp Glu Thr Val Ser Gln Met Asp Lys Ala Glu Leu
50      55      60
Glu Glu Arg Trp Arg Leu Ala Gln Ala Phe Asn Ala Thr Leu Lys Pro
65      70      75      80
Ser Glu Ile Leu Asp Pro Phe Thr Glu Gln Glu Lys Lys Lys Gly Val
85      90      95
Ser Glu Tyr Ala Asn Met Leu Lys Val His Glu Arg Ile Gly Tyr Val
100     105     110
Glu Ile Pro Ala Ile Asp Gln Glu Ile Pro Met Tyr Val Gly Thr Ser
115     120     125
Glu Asp Ile Leu Gln Lys Gly Ala Gly Leu Leu Glu Gly Ala Ser Leu
130     135     140
Pro Val Gly Gly Glu Asn Thr His Thr Val Ile Thr Ala His Arg Gly

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145		150		155		160									
Leu	Pro	Thr	Ala	Glu	Leu	Phe	Ser	Gln	Leu	Asp	Lys	Met	Lys	Lys	Gly
		165		170		175									
Asp	Ile	Phe	Tyr	Leu	His	Val	Leu	Asp	Gln	Val	Leu	Ala	Tyr	Gln	Val
		180		185		190									
Asp	Gln	Ile	Val	Thr	Val	Glu	Pro	Asn	Asp	Phe	Glu	Pro	Val	Leu	Ile
		195		200		205									
Gln	His	Gly	Glu	Asp	Tyr	Ala	Thr	Leu	Leu	Thr	Cys	Thr	Pro	Tyr	Met
		210		215		220									
Ile	Asn	Ser	His	Arg	Leu	Leu	Val	Arg	Gly	Lys	Arg	Ile	Pro	Tyr	Thr
225				230		235									240
Ala	Pro	Ile	Ala	Glu	Arg	Asn	Arg	Ala	Val	Arg	Glu	Arg	Gly	Gln	Phe
			245			250								255	
Trp	Leu	Trp	Leu	Leu	Gly	Ala	Met	Ala	Val	Ile	Leu	Leu	Leu	Leu	
		260				265								270	
Tyr	Arg	Val	Tyr	Arg	Asn	Arg	Arg	Ile	Val	Lys	Gly	Leu	Glu	Lys	Gln
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	290					295									

<210> 36
 <211> 304
 <212> PRT
 <213> Streptococcus pneumoniae srtC

<400> 36															
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	20														
Leu	Val	Ser	Arg	Leu	Tyr	Tyr	Arg	Val	Glu	Ser	Asn	Gln	Gln	Ile	Ala
	35														
Asp	Phe	Asp	Lys	Glu	Lys	Ala	Thr	Leu	Asp	Glu	Ala	Asp	Ile	Asp	Glu
50	55														
Arg	Met	Lys	Leu	Ala	Gln	Ala	Phe	Asn	Asp	Ser	Leu	Asn	Asn	Val	Val
65	70														
Ser	Gly	Asp	Pro	Trp	Ser	Glu	Glu	Met	Lys	Lys	Lys	Gly	Arg	Ala	Glu
	85														
Tyr	Ala	Arg	Met	Leu	Glu	Ile	His	Glu	Arg	Met	Gly	His	Val	Glu	Ile
	100														
Pro	Val	Ile	Asp	Val	Asp	Leu	Pro	Val	Tyr	Ala	Gly	Thr	Ala	Glu	Glu
	115														
Val	Leu	Gln	Gln	Gly	Ala	Gly	His	Leu	Glu	Gly	Thr	Ser	Leu	Pro	Ile
	130														
Gly	Gly	Asn	Ser	Thr	His	Ala	Val	Ile	Thr	Ala	His	Thr	Gly	Leu	Pro
145	150														
Thr	Ala	Lys	Met	Phe	Thr	Asp	Leu	Thr	Lys	Leu	Lys	Val	Gly	Asp	Lys
	165														
Phe	Tyr	Val	His	Asn	Ile	Lys	Glu	Val	Met	Ala	Tyr	Gln	Val	Asp	Gln
	180														
Val	Lys	Val	Ile	Glu	Pro	Thr	Asn	Phe	Asp	Asp	Leu	Leu	Ile	Val	Pro
	195														
Gly	His	Asp	Tyr	Val	Thr	Leu	Leu	Thr	Cys	Thr	Pro	Tyr	Met	Ile	Asn
	210														
Thr	His	Arg	Leu	Leu	Val	Arg	Gly	His	Arg	Ile	Pro	Tyr	Val	Ala	Glu
225	230														
Val	Glu	Glu	Glu	Phe	Ile	Ala	Ala	Asn	Lys	Leu	Ser	His	Leu	Tyr	Arg
	245														
Tyr	Leu	Phe	Tyr	Val	Ala	Val	Gly	Leu	Ile	Val	Ile	Leu	Leu	Trp	Ile
	260														
Ile	Arg	Arg	Leu	Arg	Lys	Lys	Lys	Lys	Gln	Pro	Glu	Lys	Ala	Leu	Lys
	275														
Ala	Leu	Lys	Ala	Ala	Arg	Lys	Glu	Val	Lys	Val	Glu	Asp	Gly	Gln	Gln
	290														
	295														
	300														